CORONA DIVISION
NAVAL SURFACE WARFARE CENTER

CORONA

IUID Center

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MAKING SEA POWER 21 A REALITY

NSWC Corona IUID Center

Implementation Assistance

Consumer Reports

IUID Community

Innovation

Training

Our mission is to provide expertise in mission-focused lifecycle management through IUID integration.

Aspects of IUID

Political

Policies
Scope
Timelines & implementation dates

Technical

What is IUID
Marking parts
Reading & verifying the marks
IT infrastructure

Value

Serialized Item Management (SIM)
Machine readable marks
Tamper-resistant marks
(counterfeits, reserialization, ECC200)
Reconciliation of separate databases

Implementation

Item Unique Identification (IUID)

IUID is most simply thought of as a barcode.

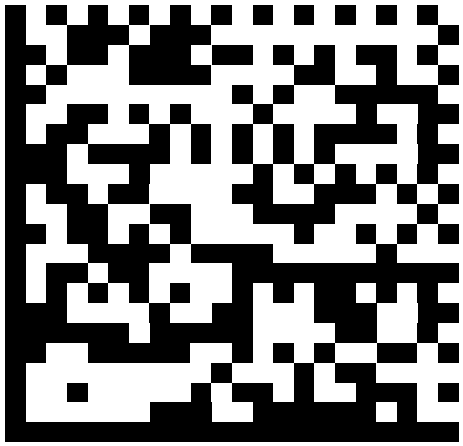
A…

Permanent,

Completely unique,

Never changing

…Barcode



Automatic Identification Technology (AIT)

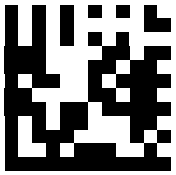
1-D Barcode

1D Barcode

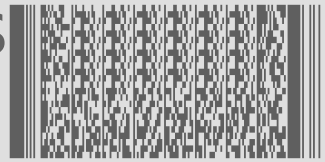
Contact Memory Buttons

2-D Barcodes

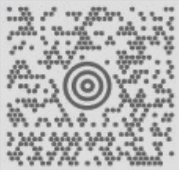
Data Matrix



PDF417



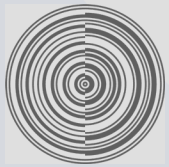
MaxiCode



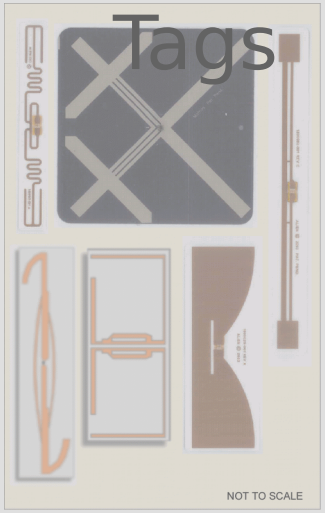
QR Code

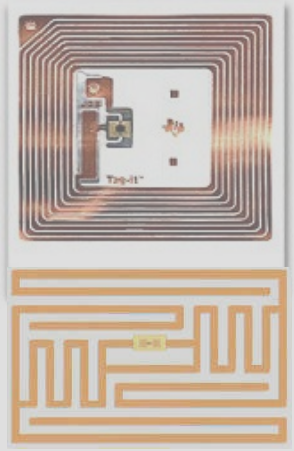
Aztec

Bullseye



Passive RFID Tags

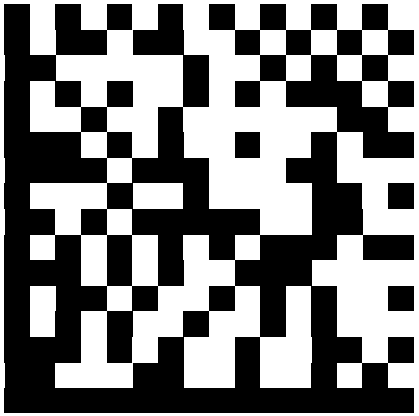




EPC RFID Tag

Active RFID Tags

Why the Data Matrix?



Scalable

for marking small parts

Capacity:

Up to 2,335 alphanumeric characters

Multiple ways to make your mark

Error Correction: ~50%

NAVSEA WARFARE CENTERS CORONA

Marking Techniques

- Labels (Stickers)
- Data Plates
- Dot Peen
- Laser Etch
- Chemical Etch
- Silk Screening
- Thermal
- Ink Jet Printing
- Laser Ablation
- Laser "Annealing"
- Cast/Forged
- Laser Bonding
- Embroidery
- Photo Etch

Compliant IUID marks are optically read, so almost any marking

What Things Should Be Marked?

- **Items ≥ $5,000**
- **DoD serialized items**
- **Mission essential items**
- **Controlled items**
- **Anything else determined by the Program Manager**

Any of these are sufficient to require IUID marking

- **New-build hardware**
- **Legacy hardware**

Hardware expected to be in the inventory after 2010

Who's Going to Mark All These Parts?

That depends…

- **New Items will be marked by the manufacturer before delivery**

- **Legacy Items will be marked as directed by the Program Manager**
  - As an enterprise effort
  - Adapting current maintenance processes
  - Traveling marking teams
  - Any other way the PM can devise

Contracts

DFARS Contract Clauses:

IUID

- DFARS 252.211-7003
- DFARS 252.211-7007

RFID

- DFARS 252.211-7006

- Required on all solicitations after 1 January 2004
- May modify contracts prior to 1 January 2004

Contract Referenced Military Standards:

IUID

- MIL-STD-130N

RFID

- MIL-STD-129P Change 4

RFID & IUID Playing Well Together

(ASN)

Untitled - Notepad

File Edit Format Help

Advanced Shipping Notice (ASN)
RFID: 3PZ28w419

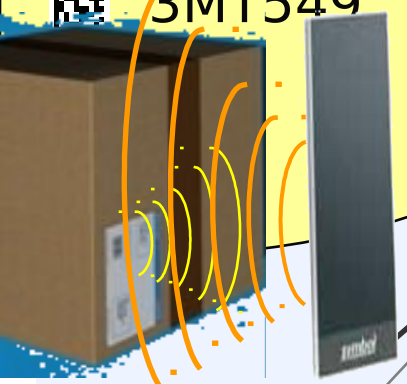
IUID	Part No	Serial No
	3MT549	12345
	3MT549	67890
	3MT549	23456
	3MT549	78901
	3MT549	34567

3MT549 89012

Ship Equipment Send ASN

pRFID Shipping Label On Box

Scan As You Pack

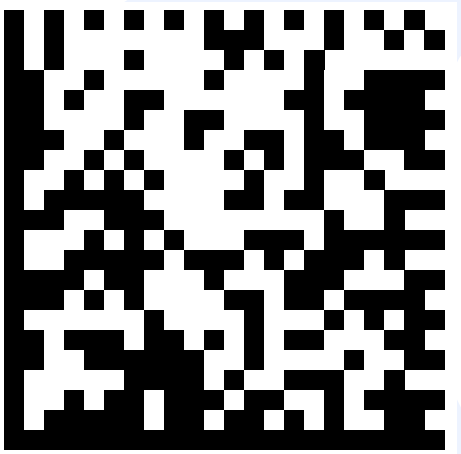


IUID Is More Than Just A Barcode

Although IUID is most simply thought of as a barcode, it is *best* thought of as a universal reference key.

To be a universal reference key everyone must follow several important rules.

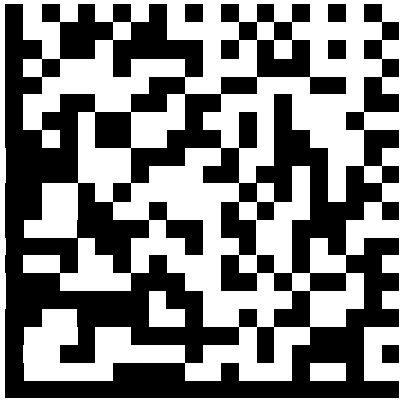
Can You Spot the IUID?



Both are a Data Matrix, but only one is an IUID

An IUID is always a Data Matrix
A Data Matrix is <u>not</u> always an IUID

Turning a Data Matrix into an IUID



The right information encoded into the right kind of mark

Semantics

[)>RS06GS17V98345GS1PT123GSS531RSEOT

Format Code:

Data Identifiers:

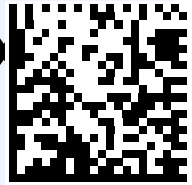
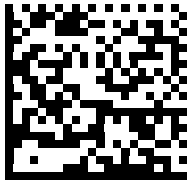
Enterprise Identifier:

Part Number:

Serial Number:

Unique Item Identifier (UII) : D98345T123531

Vocabulary Lesson #1

- **UID *Unique Identification***
- **IUID *Item Unique Identification***
- **UII *Unique Item Identifier***
  - 06141411A0B9C3D6
  - UN07799128942024351093 6
- **Data Matrix** 
- **IUID Compliant Data Matrix** 
- **IUID Compliant Data Matrix Encoded String**

IUID Data Constraints

Must be encoded into an ECC200 Data Matrix 2-D barcode

Must include semantics from ISO/IEC 15434

UII ≤ 50 characters

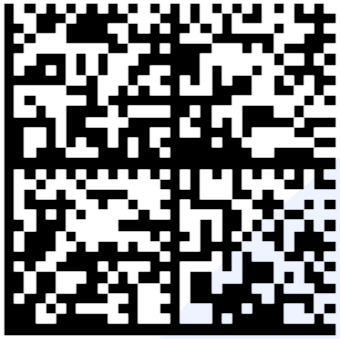
A through Z 0 through 9 / -

no lower case letters, periods, asterisks, …

The UII must be unique across DoD

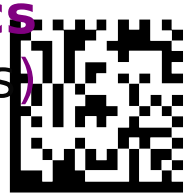
The UII must be “permanent”

IUID Constraint Examples



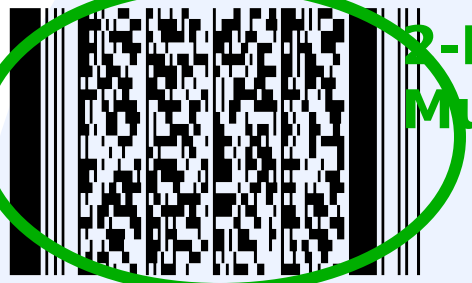
UII too long
50 characters max!

No Semantics
(i.e. [)>, r/s, g/s, eot, DIs)



D23473QT128AQ153

LDN624267OSC1234672-CABLE/COAX293-18L58P9S21GGM93285



2-D barcode is a PDF417
Must be an ECC200 Data Matrix

D23473WFH-1234563548A

D23473KFH-128456LP-3908

Duplication

D23473WFH-1234563548A

D908344-203,3-2784a983451

Uses forbidden characters

PM Responsibilities

Submit IUID implementation plan

- Update plans annually

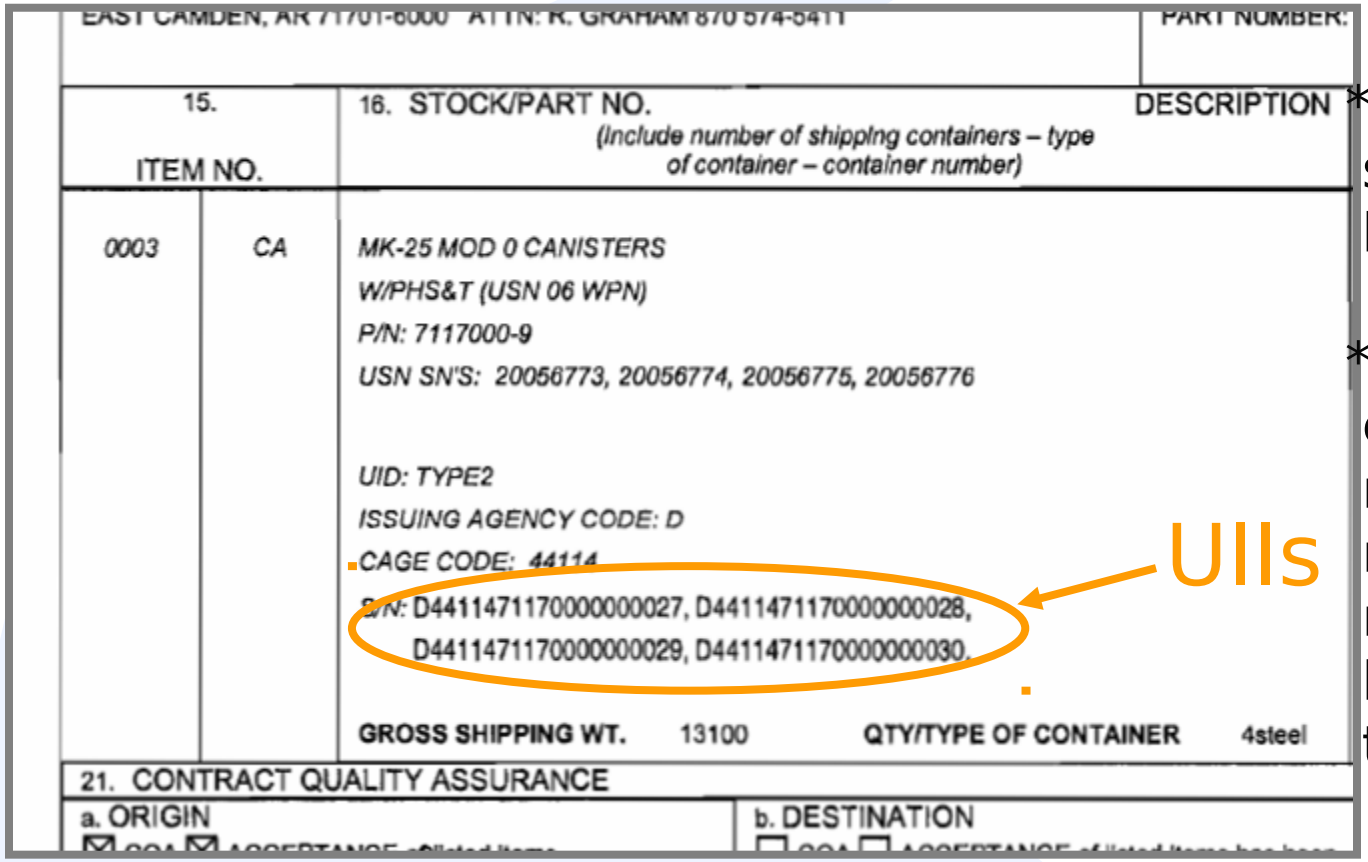
Ensure DFARS clauses are in procurement contracts

- **DFARS 252.211-7003** *"Item Identification and Valuation"*
- **DFARS 252.211-7007** *"Item Unique Identification of Government Property"*

Accommodate IUID business processes

- Registry submissions
  - Legacy marking (including PIPC/GFE/GFM/GOM)
  - Updates
- Maintain "verification" audit trail

DD250 With IUID Information



EAST CAMDEN, AR 71701-6000 ATTN: R. GRAHAM 870 574-5411 | PART NUMBER:

15. ITEM NO.		16. STOCK/PART NO. (Include number of shipping containers – type of container – container number)	DESCRIPTION
0003	CA	MK-25 MOD 0 CANISTERS W/PHS&T (USN 06 WPN) P/N: 7117000-9 USN SN'S: 20056773, 20056774, 20056775, 20056776 UID: TYPE2 ISSUING AGENCY CODE: D CAGE CODE: 44114 S/N: D4411471170000000027, D4411471170000000028, D4411471170000000029, D4411471170000000030.	

GROSS SHIPPING WT. 13100 QTY/TYPE OF CONTAINER 4steel

21. CONTRACT QUALITY ASSURANCE

a. ORIGIN ☑ COA ☑ ACCEPTANCE of listed items

b. DESTINATION ☐ COA ☐ ACCEPTANCE of listed items has been

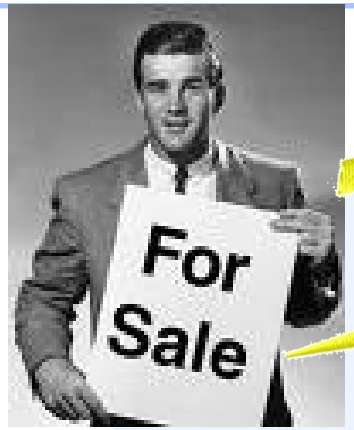
UIIs

*Contract cannot specify the UII, or how to construct it

*DCMA should ensure the item is marked with a data matrix with the right information before accepting the hardware

With DFARS 252.211-7003 in the contract, items are delivered with IUID marks and UII information

Uploading to the IUID Registry



XML file

$

WAWF

XML file

XML file

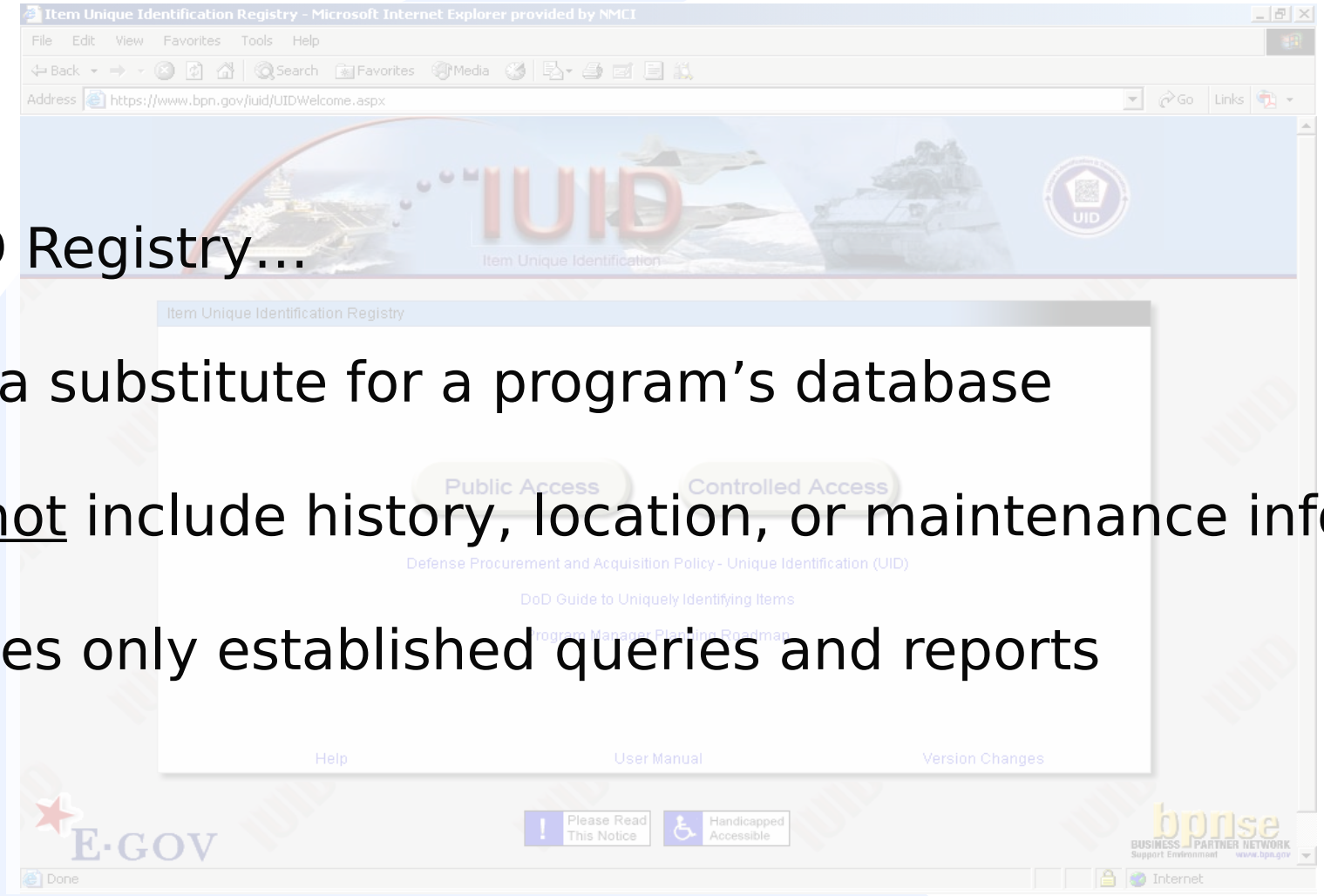
XML file

New Procurement

Web Direct

Legacy Equipment

IUID Registry



ne IUID Registry…

is not a substitute for a program's database

does not include history, location, or maintenance informati

provides only established queries and reports

https://www.bpn.gov/iuid/UIDWelcome.aspx

Getting Data from the Registry

Legacy Equipment	PIPC
Search by: - UII - Contract Number, CLIN, and/or Date - Embedded or Parent Item - Combination of Enterprise Identifier, Part Number, Serial Number, and Batch/Lot Number	Search by: - Contract Number - CAGE/DUNS Summaries by: - Contract Number and Date - CAGE/DUNS and Date

What Data Goes into the Registry

Acquisition Information

- Manufacturer
- Manufacture Date
- Cost
- Part Number
- Serial Number
- Nomenclature
- Custodianship

Parent/Child Relationships

Unique Item Identifier (UII)

Contact Information

Updates Required For Changes To

- Custodianship
- Part Number
- Marks
- Embedded Status
- Life Cycle Status

http://www.acq.osd.mil/dpap/pdi/uid/data_submission_information.html

Virtual Unique Item Identifiers (VUII)

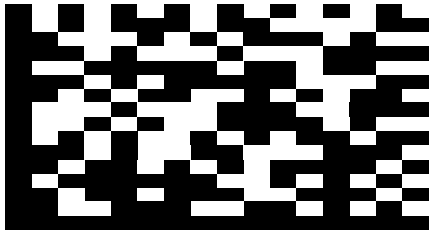
VUII is a record in the UID registry specifying the UII assigned to an item prior to its actual marking

VUII is an option for <u>some</u> legacy items

- ***Current permanent identifying marks required***

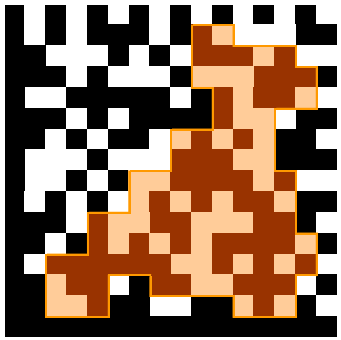
Verification

he symbol shall have a minimum print quality of 3.0/05/660, ...”
Sayeth MIL-STD-130

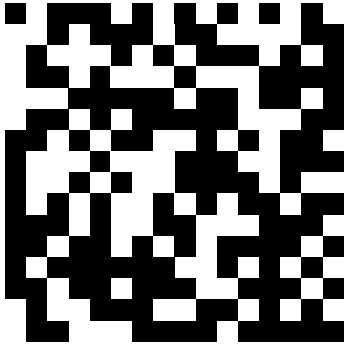


Axial Non-uniformity

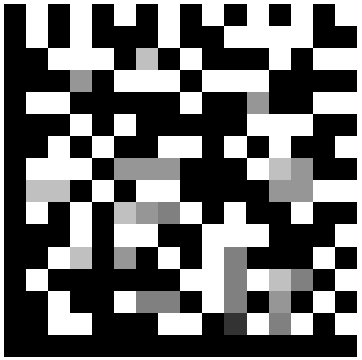
Grid Non-uniformity



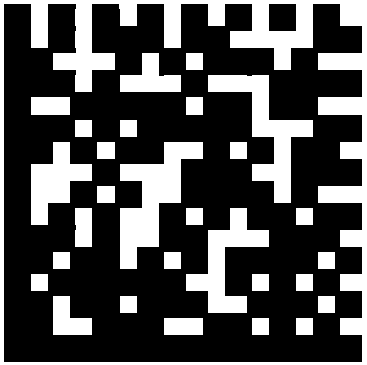
Unused Error Correction



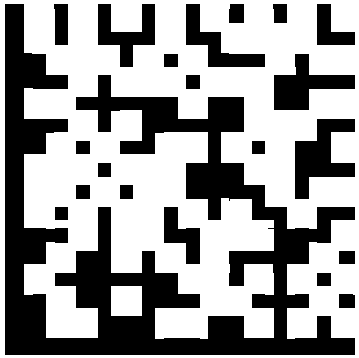
Fixed Pattern Damage



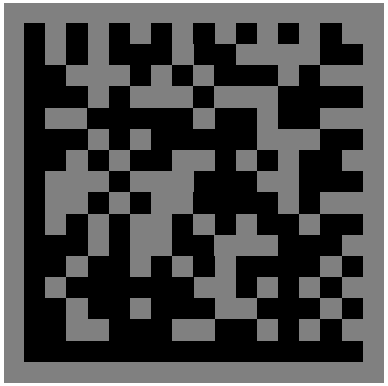
Modulation



Over-print



Under-print



Contrast

A Readable, Failing Mark

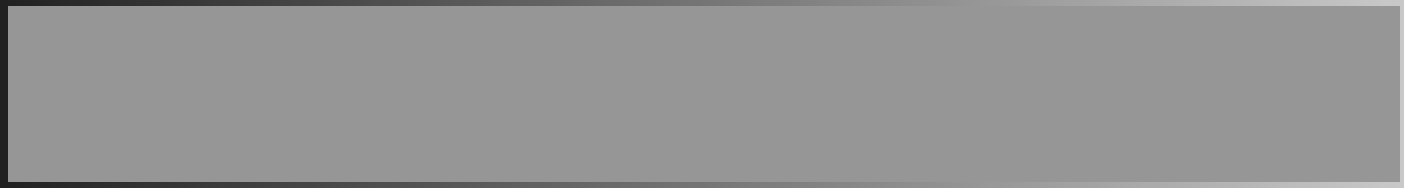
UNDER PRINT

OVER PRINT

CLOCKING PATTERN DAMAGE

FINDER PATTERN DAMAGE

The Simultaneous Contrast Illusion



Most problems within a mark are undetectable with the human eye!

Reading & Verifying Marks
(Vocabulary Lesson #2)

The vocabulary of IUID distinguishes "reading," "verifying," and "validating"

Reading **the mark decodes the text in the mark.**

Verifying **the mark ensures the quality of the mark meets the standards for contrast, squareness, straight edges, etcetera.**

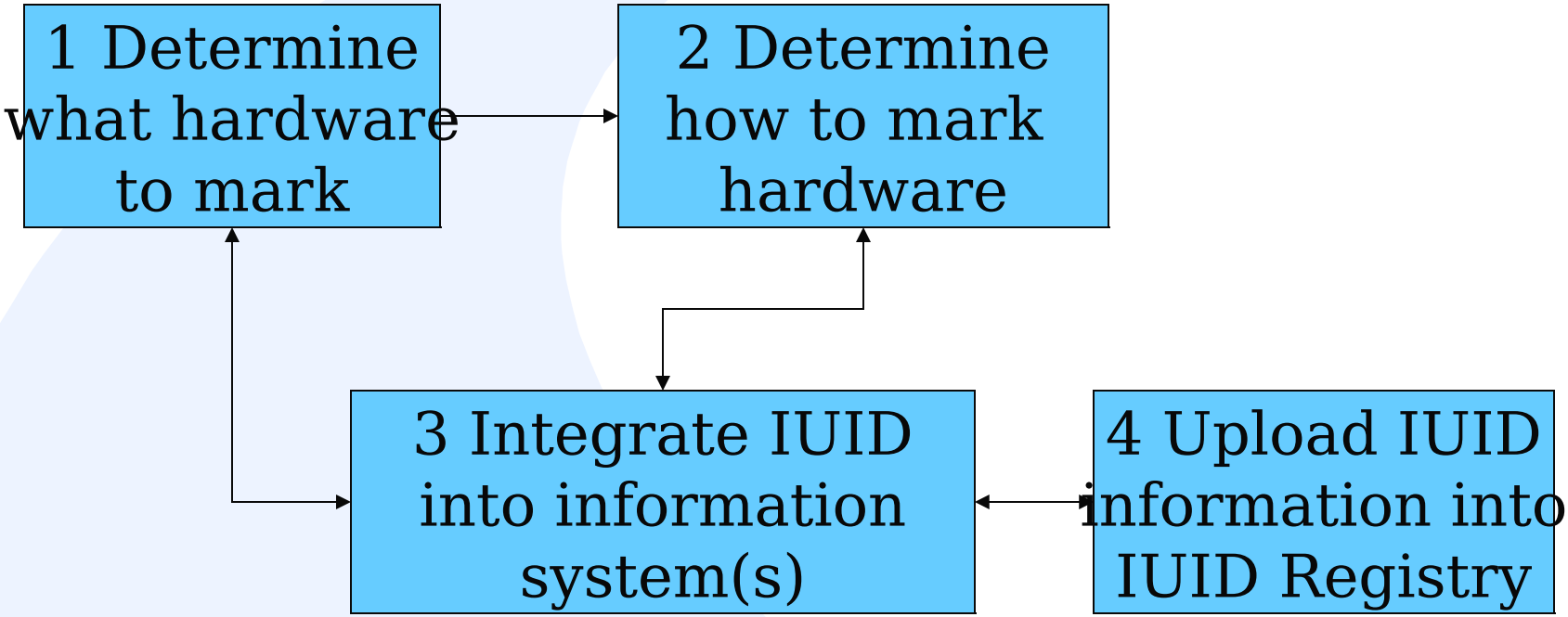
Validating **the mark makes sure all of the correct ASCII characters that ought to be in the mark are in the mark.**

Machine Readable Marks

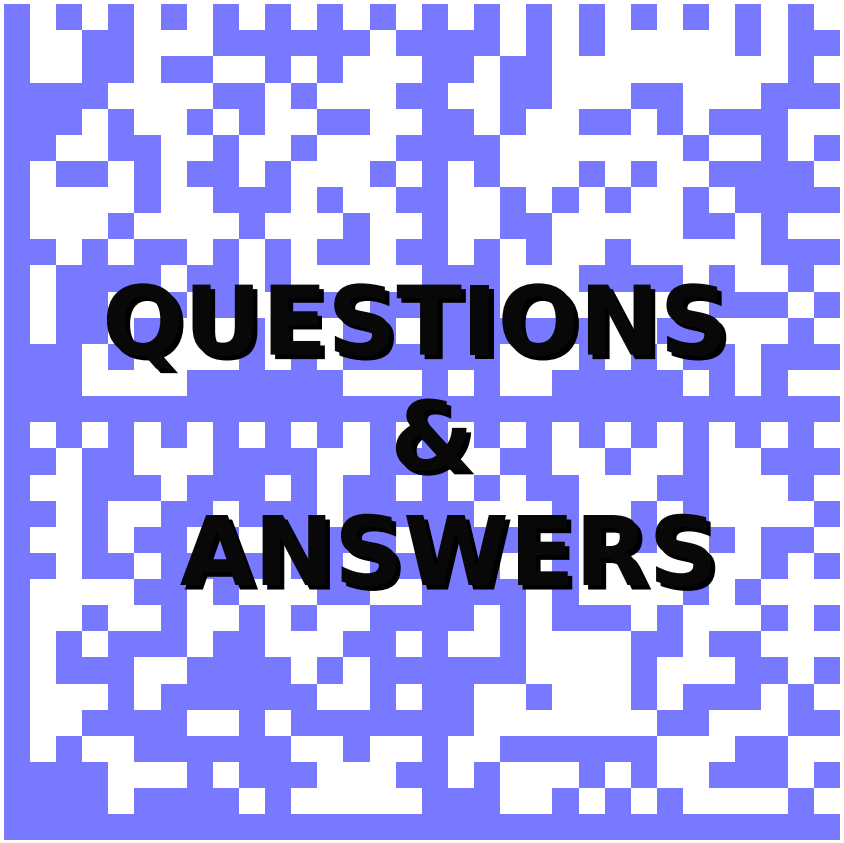
IUID machine readable marks can…

- Save time & money
  - During processing
  - Avoiding error resolution
  - Avoiding data cleaning
  - Reconciling separate databases
- Increase data accuracy
  (…and by logical extension - improve decisions made, based on data)
  - Eliminating transcription errors, interpretation errors, and assignment errors
  - Providing data redundancy within the mark (minimizes data loss due to wear/damage)
  - Eliminating unauthorized re-serialization
- Detect counterfeit parts

IUID Implementation


1 Determine what hardware to mark
2 Determine how to mark hardware
3 Integrate IUID into information system(s)
4 Upload IUID information into IUID Registry

Requirements:
1) New acquisitions must meet IUID requirements
2) Legacy hardware must meet IUID requirements
3) GFE/GFP/GOM hardware must meet IUID requirements
4) Mark quality must be verified
5) Information systems must accommodate IUID
6) Plan to get everything marked and modified by December 31, 2010


QUESTIONS
&
ANSWERS

NSWC Corona IUID Center

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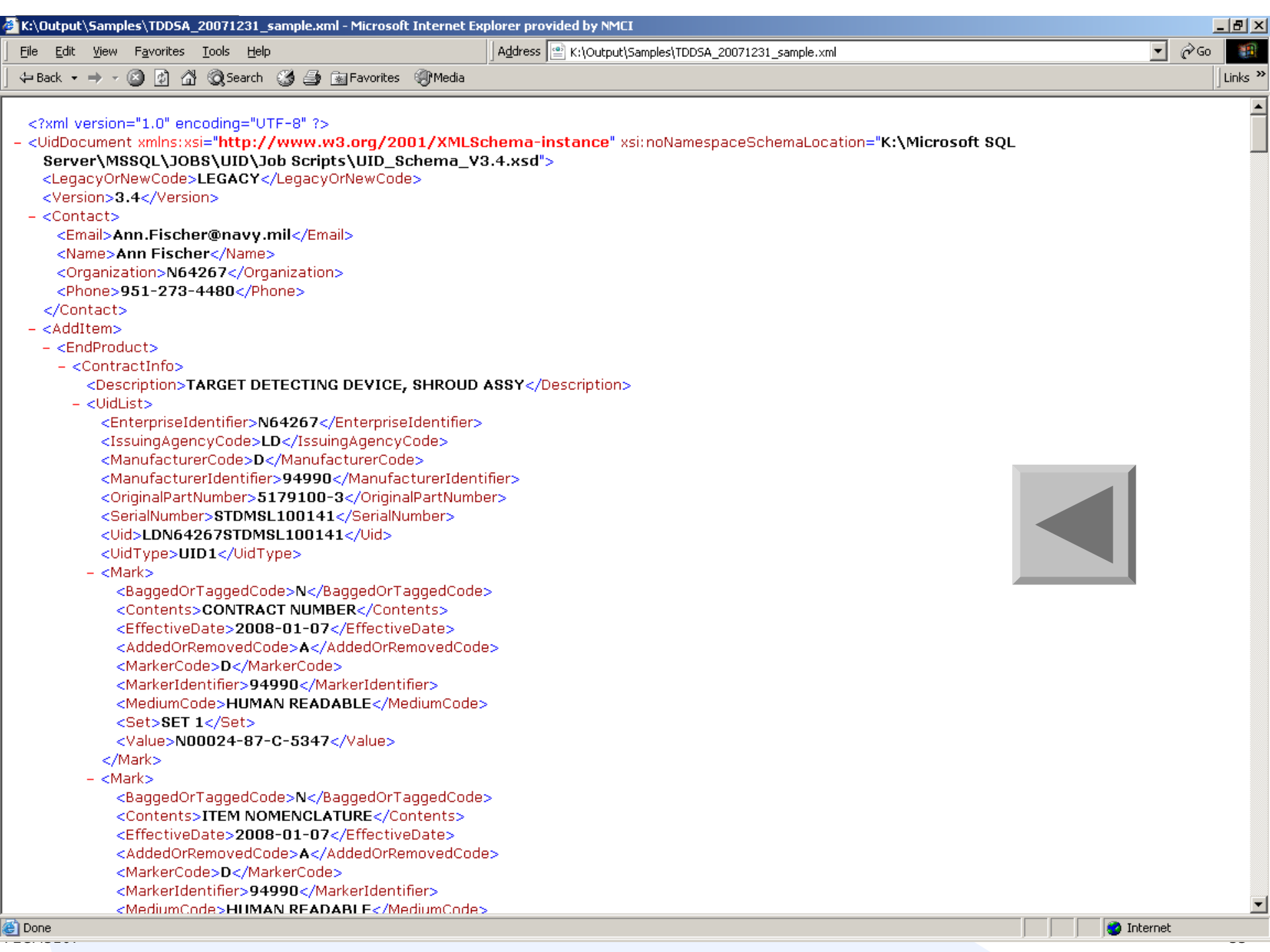
Implementation Assistance ■ Consumer Reports
IUID Community ■ Innovation ■ Training


K:\Output\Samples\TDDSA_20071231_sample.xml - Microsoft Internet Explorer provided by NMCI
File Edit View Favorites Tools Help
Address K:\Output\Samples\TDDSA_20071231_sample.xml
Go
Back Search Favorites Media
Links
<?xml version="1.0" encoding="UTF-8" ?>
<UidDocument xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="K:\Microsoft SQL Server\MSSQL\JOBS\UID\Job Scripts\UID_Schema_V3.4.xsd">
<LegacyOrNewCode>LEGACY</LegacyOrNewCode>
<Version>3.4</Version>
<Contact>
<Email>Ann.Fischer@navy.mil</Email>
<Name>Ann Fischer</Name>
<Organization>N64267</Organization>
<Phone>951-273-4480</Phone>
</Contact>
<AddItem>
<EndProduct>
<ContractInfo>
<Description>TARGET DETECTING DEVICE, SHROUD ASSY</Description>
<UidList>
<EnterpriseIdentifier>N64267</EnterpriseIdentifier>
<IssuingAgencyCode>LD</IssuingAgencyCode>
<ManufacturerCode>D</ManufacturerCode>
<ManufacturerIdentifier>94990</ManufacturerIdentifier>
<OriginalPartNumber>5179100-3</OriginalPartNumber>
<SerialNumber>STDMSL100141</SerialNumber>
<Uid>LDN64267STDMSL100141</Uid>
<UidType>UID1</UidType>
<Mark>
<BaggedOrTaggedCode>N</BaggedOrTaggedCode>
<Contents>CONTRACT NUMBER</Contents>
<EffectiveDate>2008-01-07</EffectiveDate>
<AddedOrRemovedCode>A</AddedOrRemovedCode>
<MarkerCode>D</MarkerCode>
<MarkerIdentifier>94990</MarkerIdentifier>
<MediumCode>HUMAN READABLE</MediumCode>
<Set>SET 1</Set>
<Value>N00024-87-C-5347</Value>
</Mark>
<Mark>
<BaggedOrTaggedCode>N</BaggedOrTaggedCode>
<Contents>ITEM NOMENCLATURE</Contents>
<EffectiveDate>2008-01-07</EffectiveDate>
<AddedOrRemovedCode>A</AddedOrRemovedCode>
<MarkerCode>D</MarkerCode>
<MarkerIdentifier>94990</MarkerIdentifier>
Done
Internet

Data Is Not Cheap

This is not the problem any longer

1)Data Capture

Machine readable marks

2) Data Storage

-media

-

safeguardin

g

-retrieval

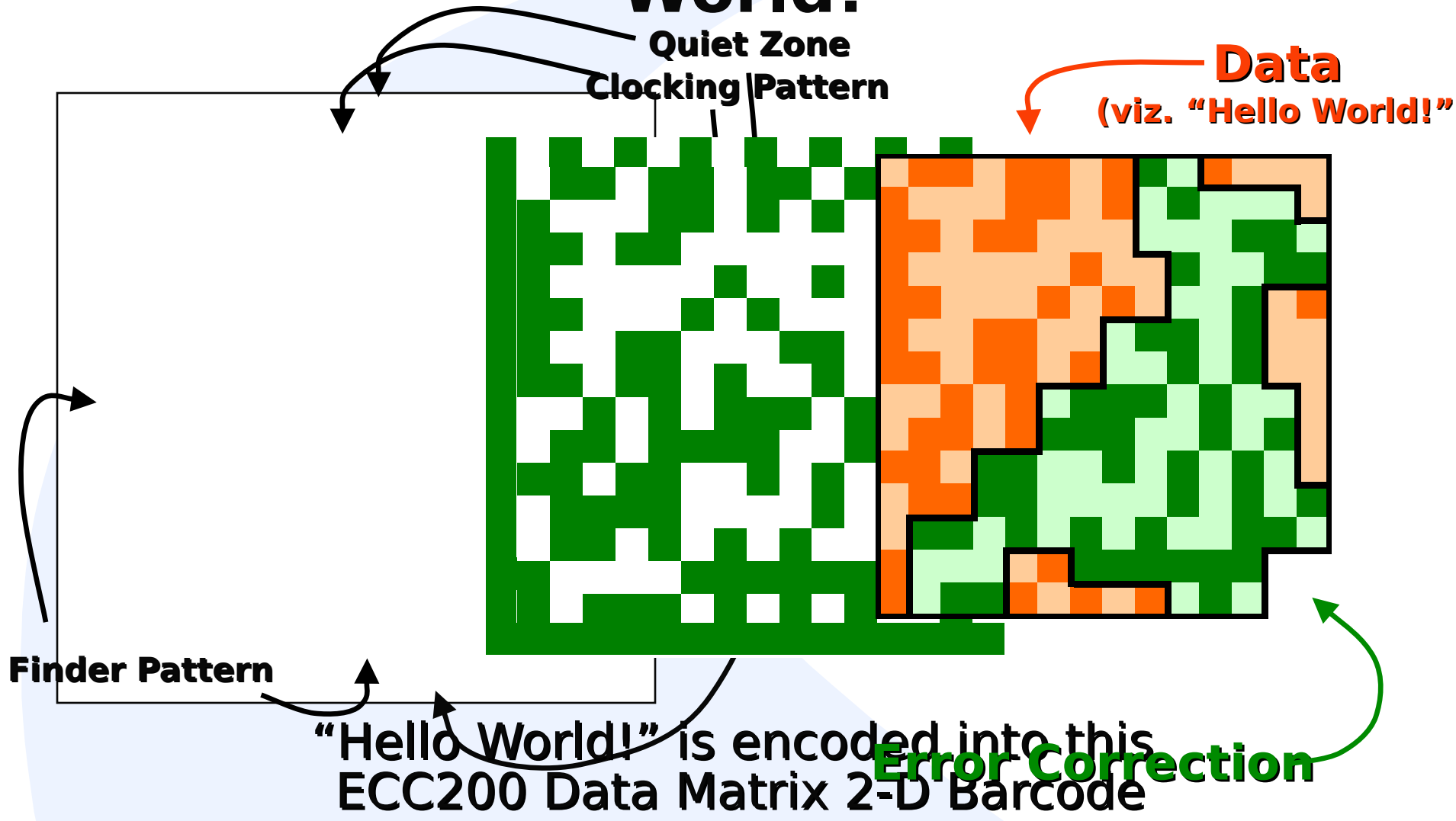
Data accuracy leads to

- Less data scrubbing
- More fidelity in analysis

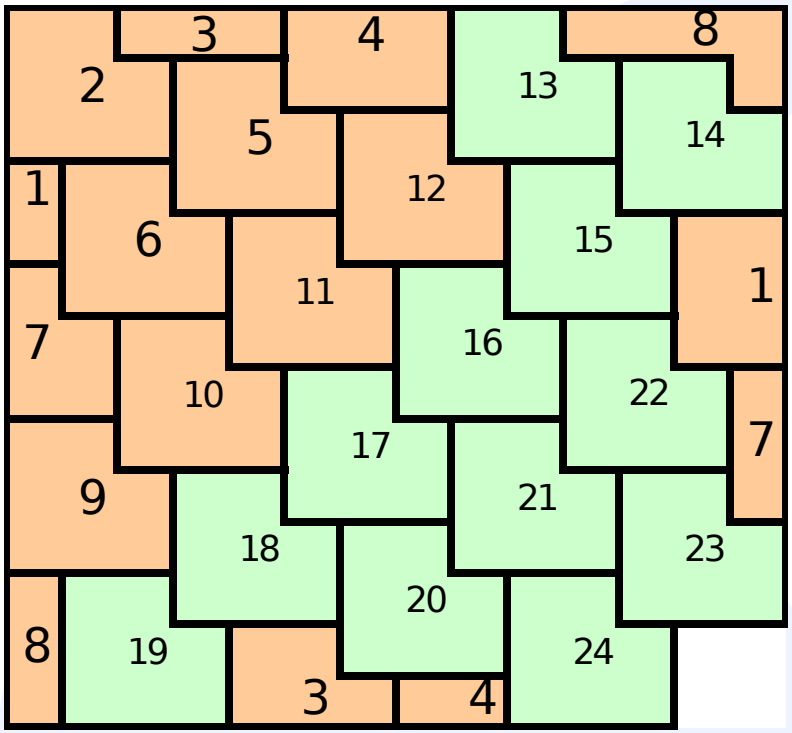
3) Data Analysis

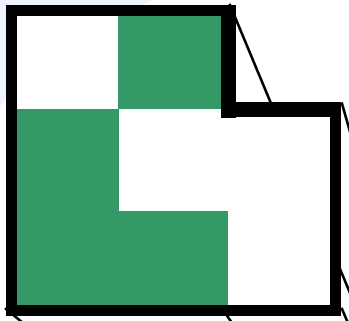
UID makes Data Cheaper

Hello World!


Quiet Zone
Clocking Pattern
Data
(viz. “Hello World!”)
Finder Pattern
“Hello World!” is encoded into this ECC200 Data Matrix 2-D Barcode
Error Correction

Data Matrix Map



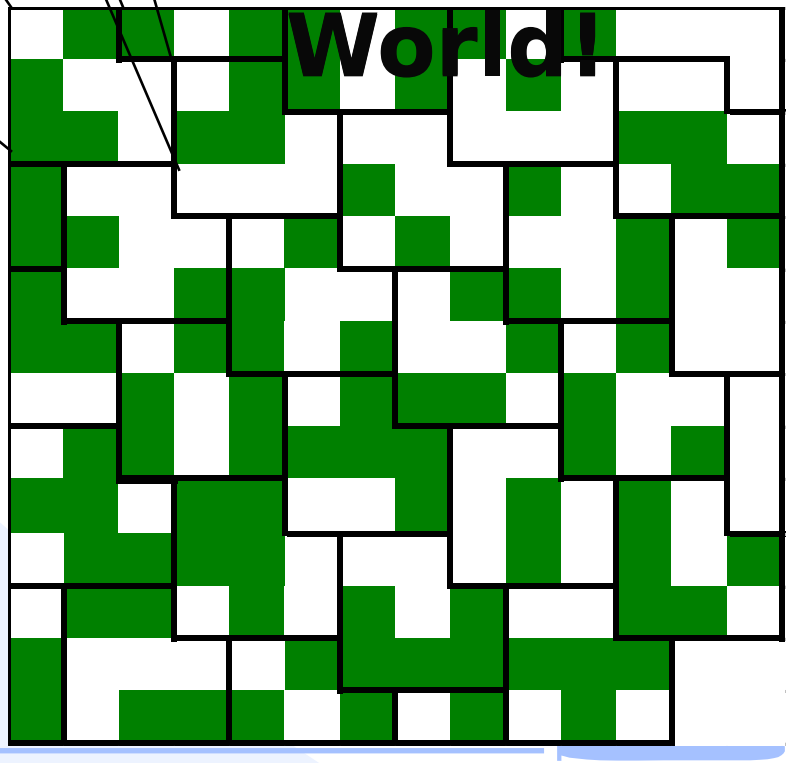


1	2	
3	4	5
6	7	8

01100110 = 102

ASCII → “e”

Hello World!



A 16 x 16 Data Matrix holds

12 bytes with the data

&

12 error-correcting bytes

But 102 isn't an "e"

The data itself goes through a layer of encoding prior to the symbol

For "ASCII Encoding," characters 0-127 have 1 added, 101 + 1 = 102

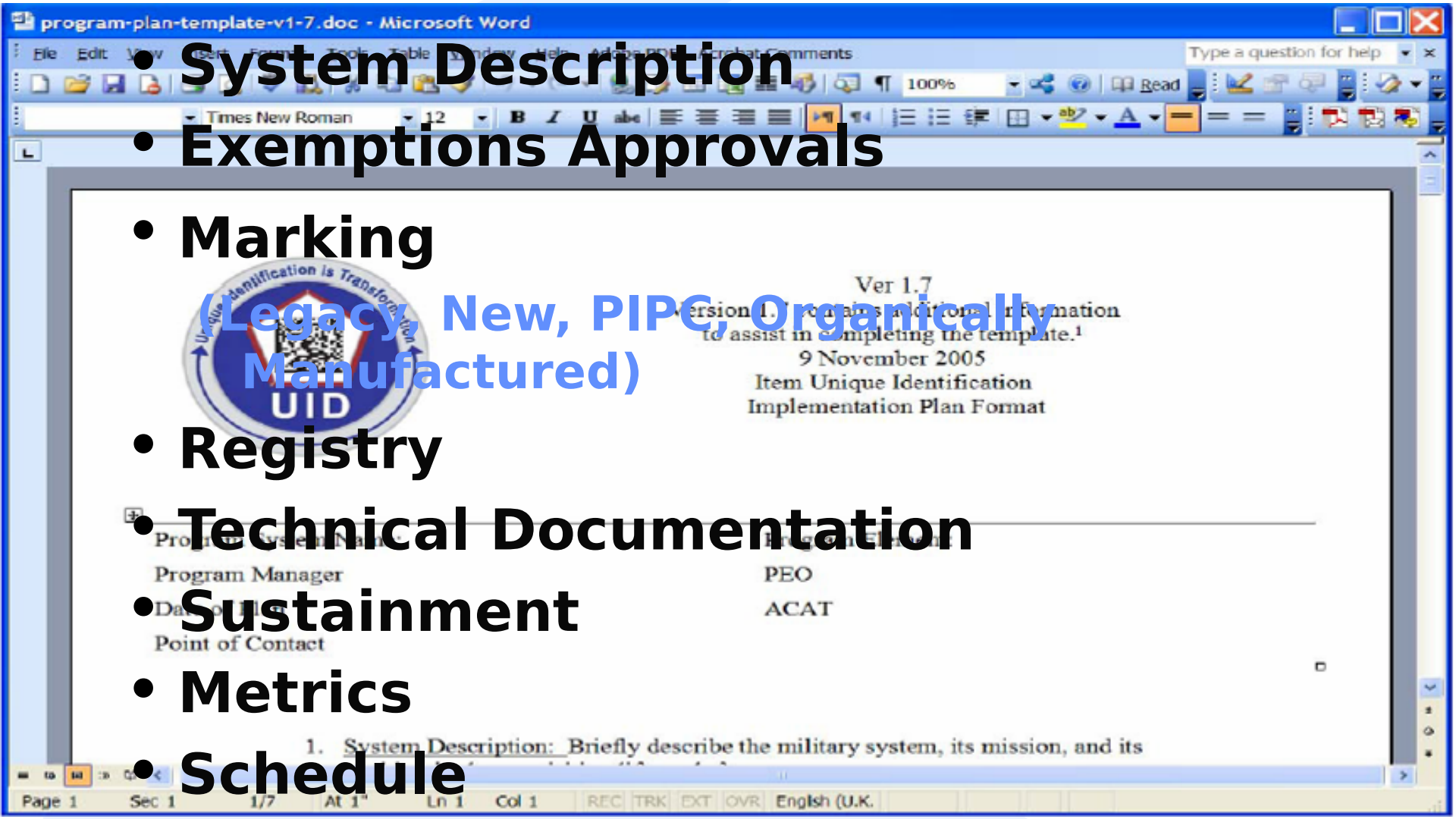
is extra complication provides different optimization

ASCII – Digits optimized
2 : 1,
C40 – Uppercase letters optimized
3 : 2,
TEXT – Lowercase letters optimized
3 : 2,

Implementation Plan Template

- System Description
- Exemptions Approvals
- Marking
- Registry
- Technical Documentation
- Sustainment
- Metrics
- Schedule

(Legacy, New, PIPC, Organically Manufactured)



Benefits of VUII

VUII allows compliance with established UID timelines without touching each piece of hardware in inventory

VUII reserves the unique identifier in the registry

Prevents problems with another program having the same unique identifier for a different part

VUII Warnings

Doubles some work

- ***One upload to the registry for VUII***
- ***One upload to the registry when marked***

Marking must ensure a match between the registry and the part in hand

- ***Limits some options which are useful given the verification requirement after marking***

Honest Sir, That's How I Got the Gage

Marines reserialize gages to pass inspection

Accountability is lost
Errors enter the information system

With UID Reserialization is No Longer a Problem